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Table of large (Δ, D)-graphs

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Abstract

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Given is a table of large (Δ, D)-graphs (Table 1).

Graphs.

$2cy$	Connection of two cycles [2],
$9a$	Cayley graphs found in a paper by 9 authors [7],
Allwr	special graphs found by Allwright,
BD	construction by Bond and Delorme [5],
Cam	Cayley graphs found by Campbell [6],
CCD	Cayley graphs found by Chudnovsky, Chudnovsky and Denneau [8],
*CR**	chordal rings found by Quisquater [19],
Din	Cayley graphs found by Dinneen [14],
Dinn	Cayley graphs found by Dinneen (August 1990),
Doty	chordal rings found by Doty [15],
C_n	cycle on n vertices,
GFS	special graph by Gómez, Fiol and Serra [17],
H_q	incidence graph of a regular generalized hexagon [3],
HS	Hoffman–Singleton graph,
K_n	complete graph,

Table 1

	D								
Δ	2	3	4	5	6	7	8	9	10
3	P	$C_5 * F_4$	*YFA*	*YFA*	*GFS*	*CR**	*CR**	2*cy*	2*cy*
	10	20	38	70	130	184	320	540	938
4	$K_3 * C_5$	*Allwr*	$C_5 * C_{19}$	H_3'	*GFS*	*CCD*	*CCD*	*CCD*	*CCD*
	15	41	95	364	734	1 081	2 943	7 439	15 657
5	$K_3 * X_8$	*Lente*	2*cy*	$H_3'd$	*GFS*	*Dinn*	*Dinn*	2*cy*	2*cy*
	24	70	184	532	2 742	4 380	12 246	41 684	132 000
6	$K_4 * X_8$	$C_5 * C_{21}$	9*a*	*Dinn*	*GFS*	*Dinn*	*Dinn*	2*cy*	2*cy*
	32	105	355	1 088	7 832	14 878	53 368	210 000	900 000
7	*HS*	2*cy*	2*cy*	*Dinn*	*GFS*	*Dinn*	2*cy*	9*a*	*Cam*
	50	136	506	2 460	10 554	41 024	150 000	911 088	4 773 696
8	P_7'	9*a*	*Dinn*	*Dinn*	*GFS*	*Dinn*	2*cy*	2*cy*	*Cam*
	57	203	915	4 108	39 258	104 808	481 179	2 400 000	7 738 848
9	$P_8'd$	Q_8'	*Din*	*Dinn*	*GFS*	*Dinn*	2*cy*	*Dinn*	*Cam*
	74	585	1 254	6 890	74 954	217 622	1 320 000	4 965 098	19 845 936
10	P_9'	$Q_8'd$	*GFS*	9*a*	*GFS*	*Din*	2*cy*	2*cy*	$Q_7\Sigma_2H_7$
	91	650	1 820	12 144	132 932	490 052	3 000 000	9 000 000	47 059 200
11	$P_9'd$	$Q_8'd$	$Q_7(T_4)$	*Dinn*	$H_7(T_4)$	*Dinn*	*Cam*	*Cam*	$Q_7\Sigma_6H_8$
	94	715	3 200	16 578	156 864	914 414	4 200 000	21 345 930	179 755 200
12	P_{11}'	$Q_8'd$	$Q_8' * X_8$	*Dinn*	*GFS*	*Dinn*	2*cy*	$P_8\Sigma_7H_9$	$Q_8\Sigma_6H_9$
	133	780	4 680	26 268	354 422	1 732 514	10 000 000	48 493 900	466 338 600
13	$P_{11}'d$	$Q_8'd$	$Q_9(T_4)$	*Dinn*	$H_9(T_4)$	*Cam*	2*cy*	$P_9\Sigma_1H_9$	$Q_9\Sigma_6H_9$
	136	845	6 560	33 354	531 440	2 723 040	15 000 000	72 541 560	762 616 400
14	P_{13}'	$Q_8'd$	$Q_9(T_5)$	$K_1\Sigma_8Q_{11}$	*GFS*	$K_1\Sigma_8H_{11}$	*Dinn*	$P_9\Sigma_7H_{11}$	$Q_8\Sigma_6H_{11}$
	183	910	8 200	51 240	804 624	6 200 460	29 992 052	164 755 080	1 865 452 680
15	$P_{13}'d$	$(\otimes Q_{2,4})'$	$Q_{11}(T_4)$	$K_1\Sigma_8Q_{11}$	$H_{11}(T_4)$	$K_1\Sigma_8H_{11}$	$K_{8,8}\Sigma_6H_{11}d$	$P_{11}\Sigma_1H_{11}$	$Q_{11}\Sigma_6H_{11}$
	186	1 215	11 712	58 560	1 417 248	7 086 240	35 947 392	282 740 976	3 630 989 376
16	$P_{13}'d$	$(\otimes Q_3)'$	$Q_{11}(T_5)$	$(\otimes H_3)'$	$H_{11}(T_5)$	$K_1\Sigma_8H_{13}$	$K_{9,9}\Sigma_6H_{13}$	$P_9\Sigma_7H_{11}$	$Q_{11}d\Sigma_6H_{13}$
	197	1 600	14 640	132 496	1 771 560	14 882 658	86 882 544	585 652 704	7 394 669 856

Lente special graph designed by Lente,
P Petersen graph,
P_q incidence graph of projective plane [18],
Q_q incidence graph of a regular generalized quadrangle [3],
$Q_{r,s}$ incidence graph of a generalized quadrangle [18],
T tournament,
YFA compound graphs designed by Yebra, Fiol and Alegre [1].

Operations

$G * H$ twisted product of graphs [4],
Gd duplication of some vertices of G [12],
Gi insertion of new vertices on some edges of G [12],
B' quotient of the bipartite graph B by a polarity [9],

$\otimes B$ the component with polarity of the Cartesian product of a bipartite graph B by itself [10],
$B(T)$ compound using a bipartite graph B and a tournament T [16],
$B\{T\}$ compound using a bipartite graph B and a tournament T [13],
$G\Sigma_i H$ various compounding operations [17],
$G \wedge H$ various compounding operations [13],
mH a partial graph of H [11],
ΩG special compound by Gómez and Fiol [16].

References

[1] I. Alegre, M.A. Fiol and J.L.A. Yebra, Some large graphs with given degree and diameter, J. Graph Theory 10 (1986) 219–224.

[2] R. Bar-Yehuda and T. Etzion, Connection between two cycles - a new design of dense processor interconnection networks, Tech. Rept. 528, Computer science department, Technion, Haifa (1988).

[3] C.T. Benson, Minimal regular graphs of girth eight and twelve, Canad. J. Math. 18 (1966) 1091–1094.

[4] J.-C. Bermond, C. Delorme and G. Farhi, Large graphs with given degree and diameter II, J. Combin. Theory Ser. B 36 (1984) 32–48.

[5] J. Bond and C. Delorme, New large bipartite graphs of given degree and diameter, Ars Combin. 25 (1988) 123–132.

[6] L. Campbell, Dense group networks, Discrete Appl. Math. 37/38 (1992) 65–71.

[7] L. Campbell, G.e. Carlsson, M.J. Dinneen, V. Faber, M.R. Fellows, M.A. Langston, J.W. Moore, A.P. Mullhaupt and H.B. Sexton, Small diameter symmetric networks from linear groups, IEEE Trans. Comput., to appear.

[8] D.V. Chudnovsky, G.V. Chudnovsky and M.M. Denneau, Regular graphs with small diameter as models for interconnection networks, in: L.P. Katashev and S.L. Katashev, eds., 3rd International Conference on Supercomputing, Boston, MA (1988).

[9] C. Delorme, Grands graphes de degré et diamètre donnés, European J. Combin. 6 (1985) 291–302.

[10] C. Delorme, Large bipartite graphs with given degree and diameter, J. Graph Theory 9 (1985) 325–334.

[11] C. Delorme, Examples of products giving large graphs with given degree and diameter, Discrete Appl. Math. 37/38 (1992) 157–167.

[12] C. Delorme and G. Farhi, Large graphs with given degree and diameter *i*, IEEE Trans. Comput. 33 (1984) 857–860.

[13] C. Delorme and J.-J. Quisquater, Some new compound graphs, Internal Rept. 317, LRI, Orsay Cedex (1966).

[14] M.J. Dinneen, Dense Cayley graphs using semi-direct products of groups, Tech. Rept., Department of Computer Science, Washington State University Pullman, WA (1990).

[15] K.W. Doty, Dense bus connection networks, in: Proceedings 1983 International Conference on Parallel Processing (IEEE Press, New York, 1983) 158–160.

[16] J. Gómez and M.A. Fiol, Dense compound graphs, Ars Combin. 20 (1985) 211–237.

[17] J. Gómez, M.A. Fiol and O. Serra, On large (Δ, D)-graphs, Discrete Math., to appear.

[18] W.H. Haemers, Eigenvalue Techniques in Design and Graph Theory, Mathematical Centre Tracts 121 (CWI, Amsterdam, 1980).

[19] J.-J. Quisquater, Structures d'interconnexion: constructions et applications, Thèse d'etat, LRI, Orsay Cedex (1987).